] MAGI NG SPECTROMETRY OF THE EARTH AND OTHER SOLAR SYSTEM BODIES

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Imaging spect.remet-ry is a relatively new tool for remote sensing of the earth and other bodies of the solar system, dati ng back to the late 1970s and early 1980s. It is a natural extension of the earlier multi-spectral imagers developed for remet, e sensing that- acquire images in a few, usually broad spectral bands. Imaging spectrometers combine aspects of classical spectrometers and imaging systems, making it possible to acquire literally hundreds of images of an object., each image in a separate, narrow spectral band. It is thus possible to perform spectroscopy on a pixel -by-pixel basis with the data acquired with an imaging spectrometer .

Two imaging spectrometers have flown in space and several others are planned for future cart-h and planetary missions. The French-built Phobos infrared Spectrometer, 1 SM, was part of the payload of the Soviet Mars mission in 1988, and the JPL-built Near Infrared Mapping Spectrometer, N]MS, is currently en route to Jupiter aboard the Galilee) spacecraft . Several airborne imaging spect.remet.ers have been built in the past, decade, including the JPL-built Airborne Visible/infrared imaging Spectrometer, AVIRIS, which is the only such sensor that covers the full solar reflected portion of the spectrum in narrow, contiguous spectral bands . NASA plans two imaging spectrometers for its Earth Observing System, the Moderate and the High Resolution Imaging Spectrometers, MODIS and HIRIS.

A brief overview of the application of imaging spectrometry to earth science wi l l be presented to i llustrate the value of the tool to remote sensing and indicate the types of measurements that are required. The system design for AVIRIS and a planetary imaging spectrometer will be presented to illustrate the engineering considerations and challenges that must be met in building such instruments. Several key sensor technology areas will be discussed in whi ch miniaturi zation and/or enhanced performance through micro-machining and nano-fabrication may allow smaller, more robust and more capable imaging spectrometers to be build in the future.